Lost Horse Mine Plan of Operations and Reclamation Plan

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Introduction

This document contains a plan of operations and reclamation plan for the proposed Lost Horse Mine. This plan supports a permit application for the Department of Environmental Quality, Hard Rock Division and a request for use from the Bitterroot National Forest. The Ravalli County Road and Bridge Department may pursue a separate application for additional mining near the end of the ten-year operation period proposed in this plan. If they pursue and receive approval for the plan, the reclamation plan proposed in this plan may be modified and implementation of permanent reclamation actions may be delayed.

The proposed Lost Horse Mine is located approximately nine miles south of Hamilton, Montana in the Lost Horse Creek Drainage on federal land managed by the United States Forest Service, Bitterroot National Forest. The legal description of the site is the Southwest ¼, Northwest ¼ and Northwest ¼, Southwest ¼ of Section 18, Township 4 North, Range 21 West. The site is a former surface mine that was active in the 1970's and loose fall rock was harvested from the site in 2002. The current proposal consists of collecting loose fall rock and excavating material from the site over a ten-year period. The proposed mining operation would excavate rock from previously mined areas and adjacent, un-mined areas. The total area of the proposed mine is approximately 4.9 acres.

To reach the proposed mine site, travel approximately 9 miles south from Hamilton, Montana and turn west onto Lost Horse Road. Travel 4.6 miles west to Forest Service Road 62969, turn right on this road and travel approximately 0.1 miles to the end of this road at the proposed mine location. Figure 1 shows a vicinity map of the area and Figure 2 shows a detailed overview of the proposed mine site.

GENERAL OPERATING PLAN

Introduction

The proposed Lost Horse Mine operating plan anticipates a ten-year operating period for the mine. All operations would be related to surface mining, and there would not be any underground activities. Over the ten-year operating period, an estimated 125,000 to 150,000 cubic yards of material would be excavated from the site. Details of the plan of operations are included in the sections below.

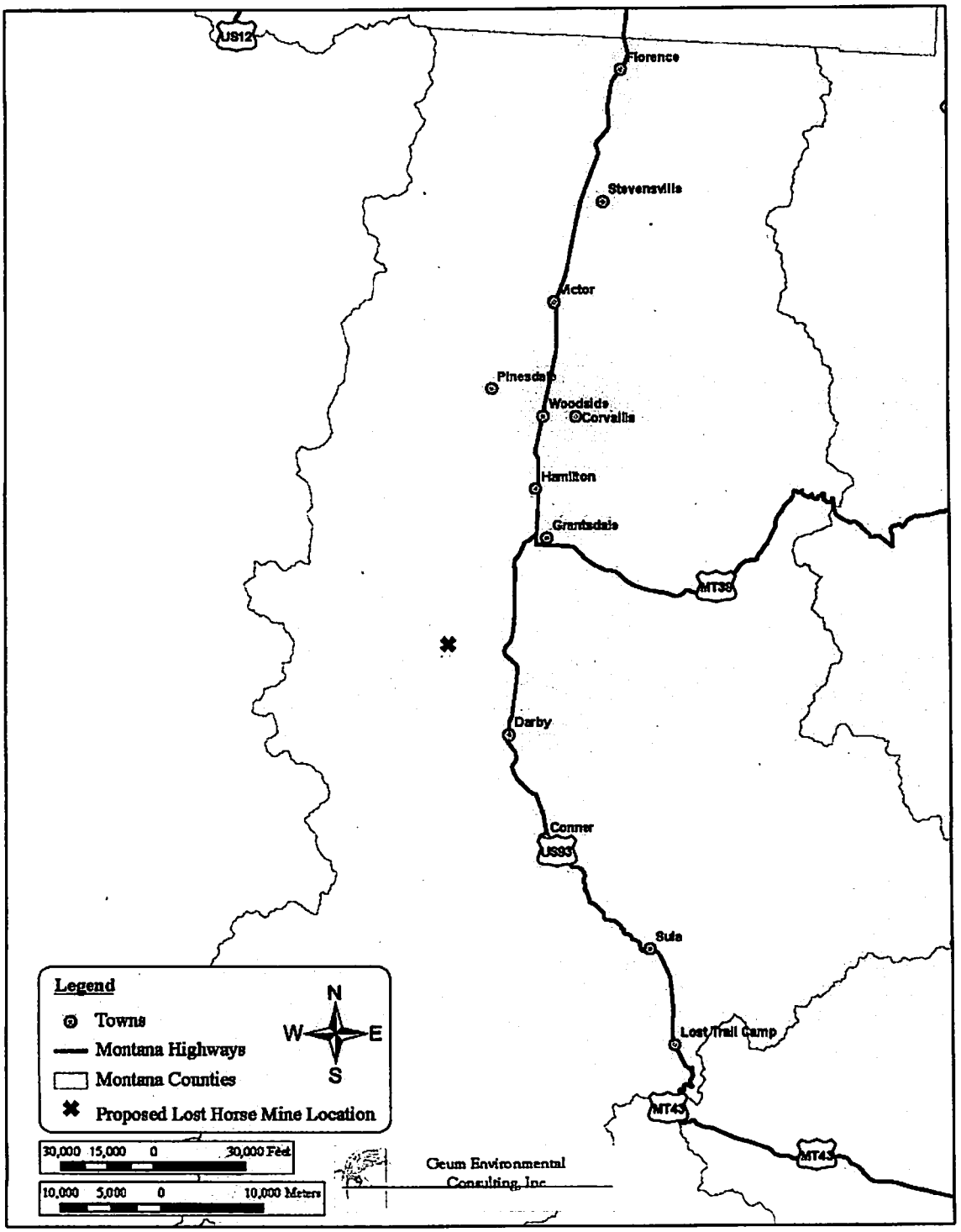

Figure 1. Vicinity map showing the location of the proposed Lost Horse Mine.

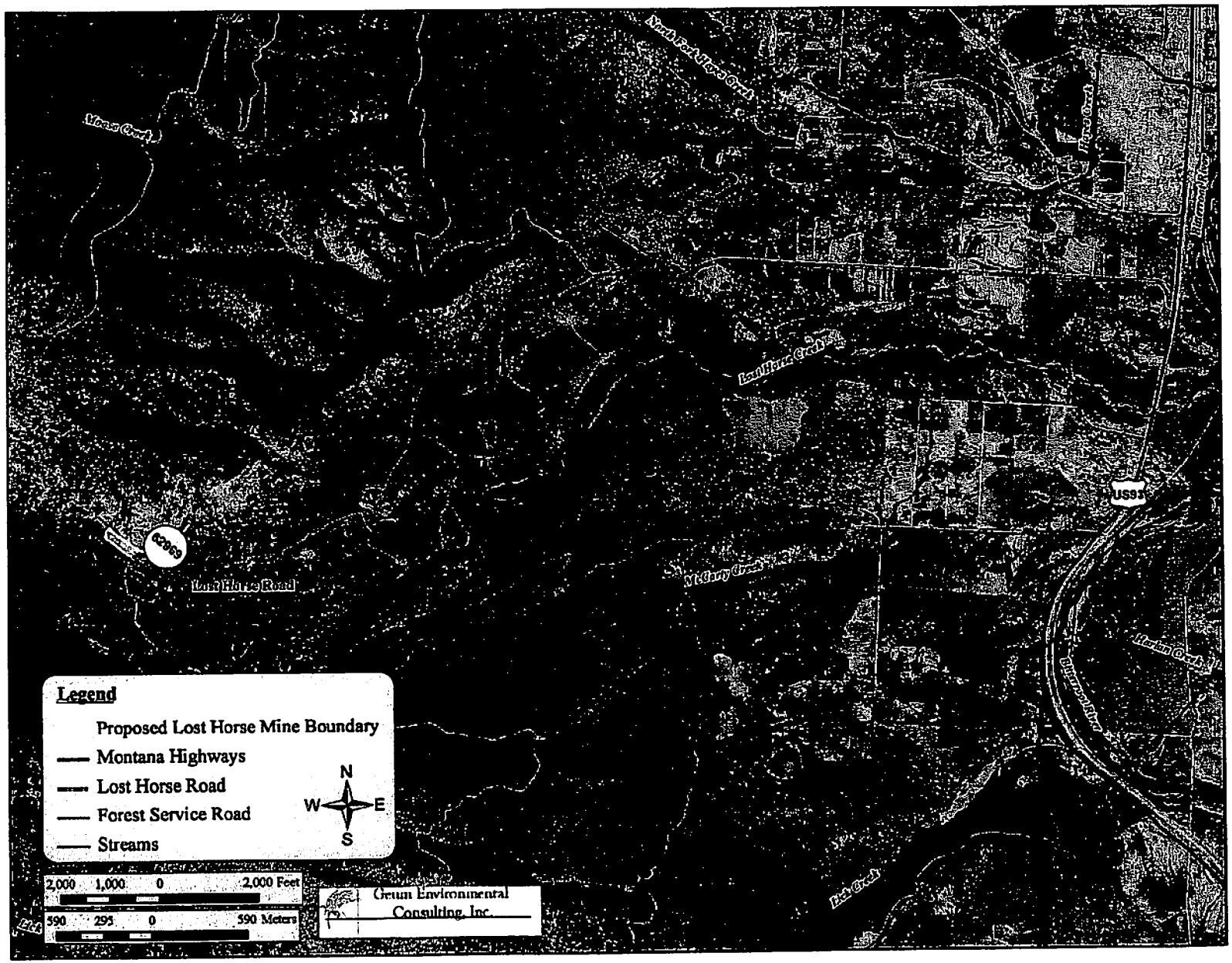

Figure 2. Project area map showing the location of the proposed Lost Horse Mine.

Equipment List

The following equipment would be utilized to operate the proposed Lost Horse Mine:

- Primary crushing plant
- Control trailer for plant
- Conveyors
- Screens
- Hydraulic excavator
- Dump trucks
- Seven cubic yard loader and potentially one smaller loader
- 70,000 pound (or smaller) crawler tractor (bulldozer)
- Diesel powered portable generating plant

The equipment would be moved throughout the site as operations proceed. In general, operations would proceed west to east through the site. Earthmoving equipment would be kept near the area of active excavation. Crushing and screening equipment would be kept near the center of the mine. Photo 1 below shows the general location of where equipment would be located at the site. Figure 3 below shows the general mine layout and the proposed locations for equipment.

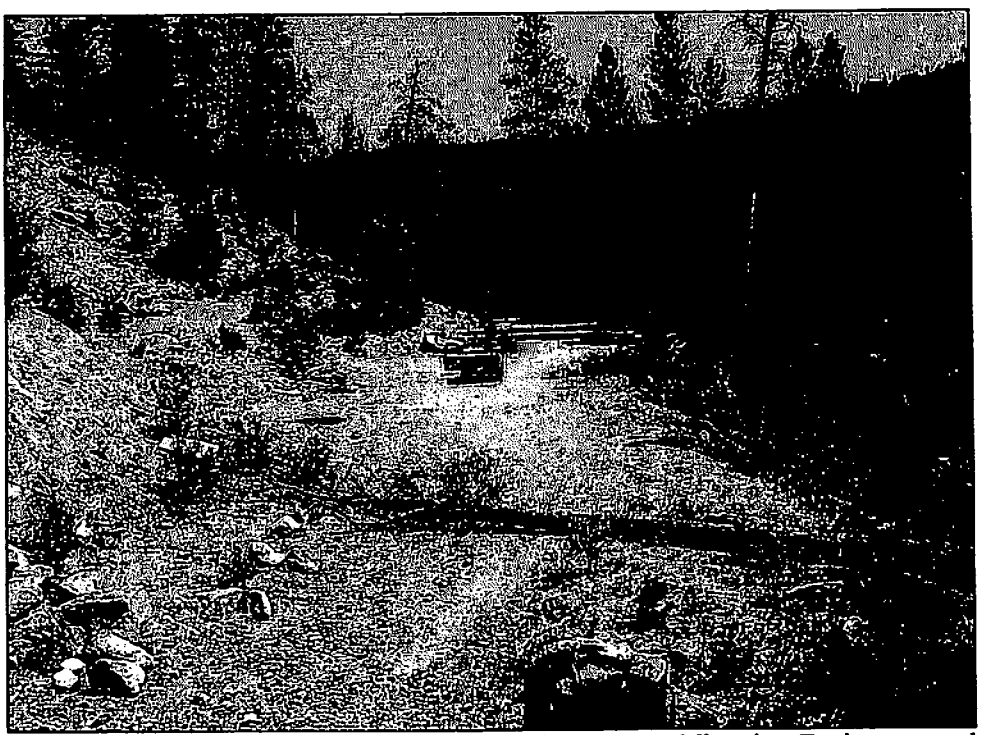

Photo 1. View looking east through the proposed Lost Horse Mine site. Equipment would be staged near where the truck is parked—to the left (north) of the truck.

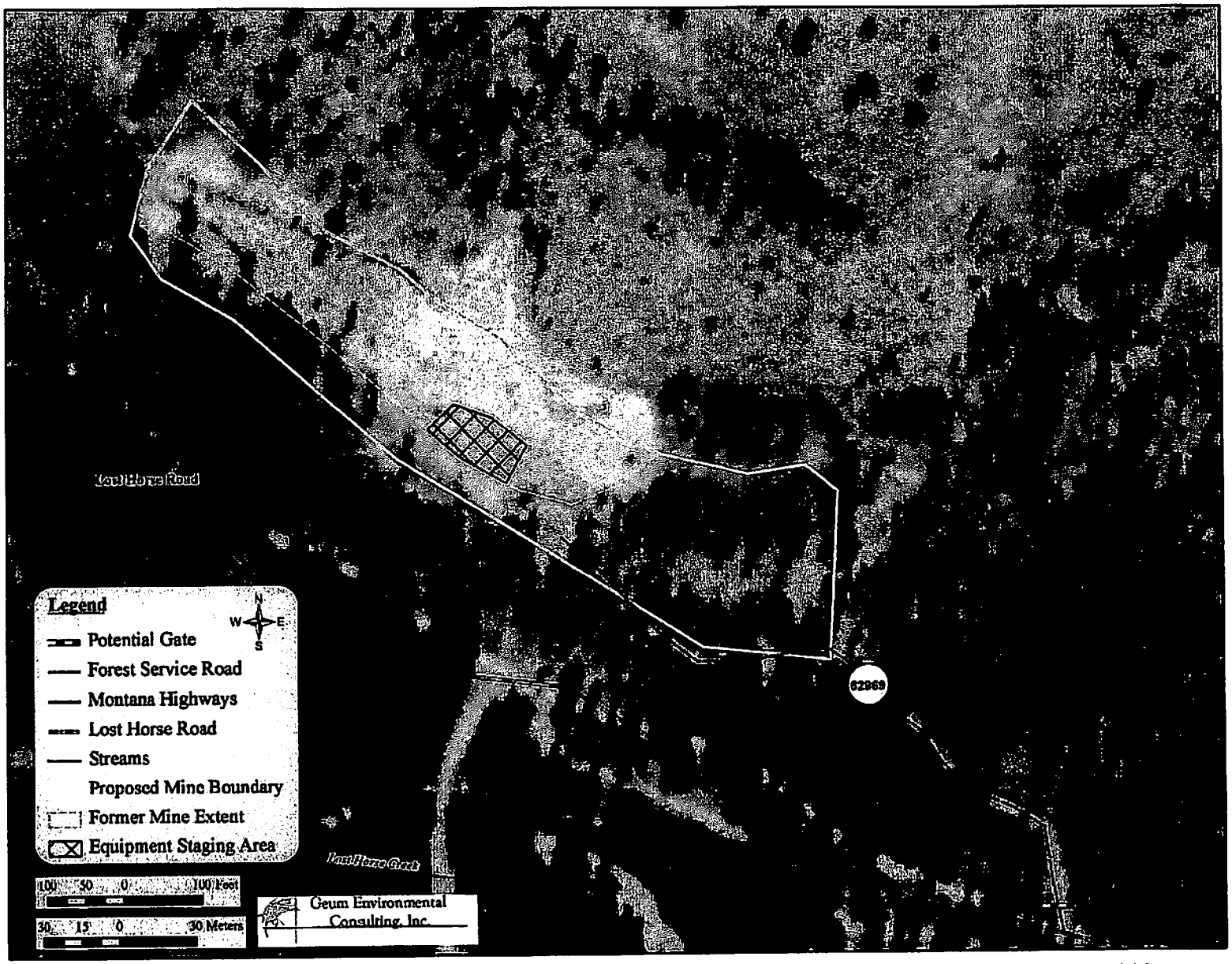

Figure 3. Plan view of the proposed Lost Horse Mine showing general operations features. Vegetation would be cleared from all areas within the mine boundary that were not cleared as part of earlier mining operations.

Personnel Requirements

The proposed mine would be operated by the Ravalli County Road and Bridge Department staff. No additional employees are anticipated being needed to support the mine operations.

Water Consumption and Source

A sprinkler system on the crusher may be used to control dust. Water would be brought to the proposed mine site on a truck and would be kept in a storage tank at the site. No water would be taken from the site or from the nearby Lost Horse Creek.

Power Consumption and Source

All power needs would be supplied by on-site, diesel powered generators that would be brought to the site during operations and removed at the end of the operation period.

Sewage Treatment

Any sewage would be self contained and removed from the site.

Solid Waste Disposal

All solid wastes would be regularly hauled away from the site.

Transportation

During operation of the mine, the Ravalli County Road and Bridge Department would increase the level of service for Lost Horse Road. Additional services may include dust control, snow removal and any necessary resurfacing or regrading during active operation of the mine. The Ravalli County Road Bridge Department would also implement physical improvements to Forest Service Road 62969 from Lost Horse Road to the mine site. Improvements to the roadway may include:

- Clearing the roadway of debris and obstacles, including limb removal
- Grading the road surface and importing material (1 ½ inch minus material from the proposed mine) to build a stable road base

Special Systems

A primary crushing plant and associated equipment including a diesel generator, support trailer, conveyor and screens would be located at the mine site. The average daily amount of rock that would be processed is estimated at 15,000 tons per day.

Spill reporting and clean up would follow guidelines recommended by the Montana Department of Environmental Quality Enforcement Division.

Fire Protection

The proposed Lost Horse Mine would operate from mid-October to mid-April and would not be operated during the summer months, and would never be operated during periods of high or extreme fire danger outside of the mid-October to mid-April operational window. Equipment to be used for operations has spark arrestors. Any fire restrictions issued by the United States Forest Service or other agency for operations during the mid-October to mid-April time period would be followed.

Impoundments and Diversions

No impoundments or diversions would be used for the proposed Lost Horse Mine operations.

Topsoil and Subsoil Salvage

A portion of the proposed Lost Horse Mine site has been mined in the past (Figure 3) and surface materials consist of rock, gravel and smaller material in both previously mined and unmined areas. No topsoil is present in the previously mined areas. In the eastern, unmined portion of the proposed mine there are mature conifers with virtually no topsoil over coarse substrate that is the desired material for the mining operation (Photo 2). Trees and other brush would be cleared and stockpiled on site. If sufficient material is present, a tub grinder would be used to reduce the material to mulch which would be utilized during final reclamation. No topsoil or subsoil is available for salvage or stockpiling.

Photo 2. Example of the scattered vegetation and coarse substrate with little to no topsoil in the eastern, undisturbed portion of proposed Lost Horse Mine site.

Public Nuisance

The area to the west of the proposed Lost Horse Mine is seasonally used for rock climbing and climbers currently use the proposed mine site for parking. Parking would be redirected to the Lost Horse Creek recreation area located on the opposite side of Lost Horse Creek Road near the start of Forest Service 62969. The mine would be operated outside of the peak recreational time of year, so impacts to the use of the adjacent areas by climbers would be limited. In addition, the mine would only be operated Monday through Friday and not on the weekends which would limit activity that may interfere with recreational activities. The Ravalli County Road and Bridge Department will communicate with the United States Forest Service to determine whether it is necessary to install a gate on Forest Service Road 62969 during the life of the mine.

Noise

Noise levels at the mine site are anticipated to increase during operations. Decibel readings of a primary crushing plant operating at the County's old Darby Mine were recorded at 84 decibels immediately adjacent to the plant. The decibel readings decreased to between 72 and 74 decibels at 200 feet from the plant. At 500 feet from the plant, noise level readings ranged from 70 to 74 decibels. At 750 feet from the plant, noise levels ranged from 68 to 72 decibels. For comparison, a typical clothes dryer or conversation at three-feet separation has a decibel reading of 68 (Ravalli County Road and Bridge Department 2005).

Noise levels would increase from present levels during mine operations due to operating earthmoving equipment, crushers and screens. Traffic and associated noise would increase during operations as personnel arrive and leave for work shifts and as material is hauled from the mine. To decrease the effects of additional noise from mine operations, the mine would only be operated during the work week, Monday through Friday and during normal working hours from 8:00 am to 5:00 pm.

Visual Resource Management

Mature trees block the view of proposed mine site from most locations. Most of these trees occur outside of the proposed mine boundary and would remain in place during operation of the mine.

Procedures for Protection of Historical and Archaeological Values

The United States Forest Service, Bitterroot National Forest Heritage Resource Program conducted a site visit on July 28, 2006 and provided a *Cultural Resource Survey Summary/Clearance*. According to this document, "the Heritage Program manager has determined that no cultural inventory was necessary for this project due to low site probability and/or sufficient previous survey." Results of the survey were "No sites located inside the project area."

No historical or archaeological resources are anticipated at the site, but if any are found during operations, appropriate personnel, such as representatives of the Bitterroot National Forest Heritage Resource Program, the State Historic Preservation Office or the Confederated Salish and Kootenai Tribes, would be notified.

Procedures for Prevention of Wind Erosion

No wind erosion is anticipated at the proposed Lost Horse Mine because the surface material at the mine consists primarily of coarse aggregate that would not be easily transported by wind. The site would be monitored for signs of wind erosion and if any occurs, measures such as seeding may be implemented to reduce any wind erosion.

Air Quality Management

The proposed mine is not expected to adversely affect air quality. Dust control measures would be used as needed. Sprinklers on the crushing equipment would control dust and routine road operations would limit fugitive dust from material transport.

Commitment and Procedures to Avoid Disturbance or Impacts to Offsite Flora and Fauna

The boundaries of operation would be clearly marked on the ground during mining activity. Equipment would stay within the operation boundaries at all times. Photo 3

below shows an example where operation boundaries may be actually located on the ground.

Photo 3. The line in the photo shows an example of where the mine operation boundary would be located in the field. Fencing and signage would be installed to clearly mark boundaries prior to starting any mining activities.

Identification of the Activities which are to take place on the "Non-Disturbed" Acreages within the Permit Area Boundary

No "Non-Disturbed" acreages would be present with the permit area boundary of the proposed Lost Horse Mine.

Watershed Management and Water Monitoring Programs

No wetlands or riparian areas occur within the mine site. Lost Horse Creek is approximately 270 feet south of the proposed mine boundary. Mature vegetation occurs between the mine boundary and the stream at the closest point. Silt fencing may be installed along the southern boundary of the mine if it appears that there would be any runoff or siltation from the mine. The junction of Lost Horse Road and Forest Service Road 62969 is approximately 150 feet from Lost Horse Creek. Routine roadway operations would be implemented during the life of the mine to control dust and maintain a stable road surface, reducing erosion and potential sediment delivery to the stream. A continuous strip of mature vegetation occurs along the north side of Lost Horse Creek and provides some buffer between the creek and the road.

No water monitoring is planned for the proposed Lost Horse Mine because no surface or groundwater features occur within the proposed permit area boundary.

Mining Plan

The proposed Lost Horse Mine would be a hard rock quarry expected to operate for a ten-year period. Figure 3 (above) shows the area of the mine that was previously mined and the area that would be included with this operation.

Extraction methods would include first clearing loose fall rock in the previously mined area with loaders and/ or excavators. Photo 4 below shows an example of the loose fall rock that would be collected at the site. Additional material would then be excavated from this area. The ground surface elevation would be lowered approximately 100 feet in some locations by the mining operation. Figure 4 shows a topographic map of the proposed mine and the locations of sample cross-sections through the site. Figures 5, 6 and 7 show the existing elevations and proposed post-mining elevations through the three cross-sections shown in Figure 4. The existing elevation shown in these figures is based on the topographic map shown in Figure 4.

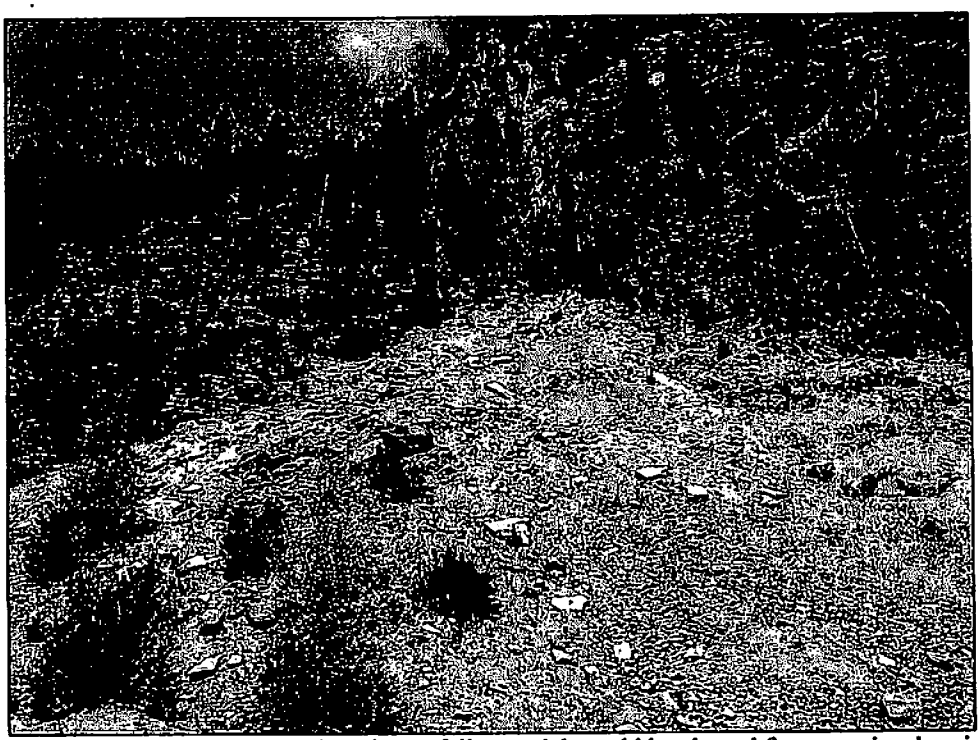

Photo 4. Example of area where loose-fall material would be cleared from previously mined areas.

In the eastern portion of the mine, trees and other vegetation would first be removed from the slope, after which material excavation would begin. As described above, trees and other brush would be cleared, stockpiled and possibly ground for mulch to be used in final reclamation of the site. Rock would be mined using loaders or excavators as described above. Final grading would blend the ground surface in this area with the ground surface west of this area (the previously mined portion of the mine).

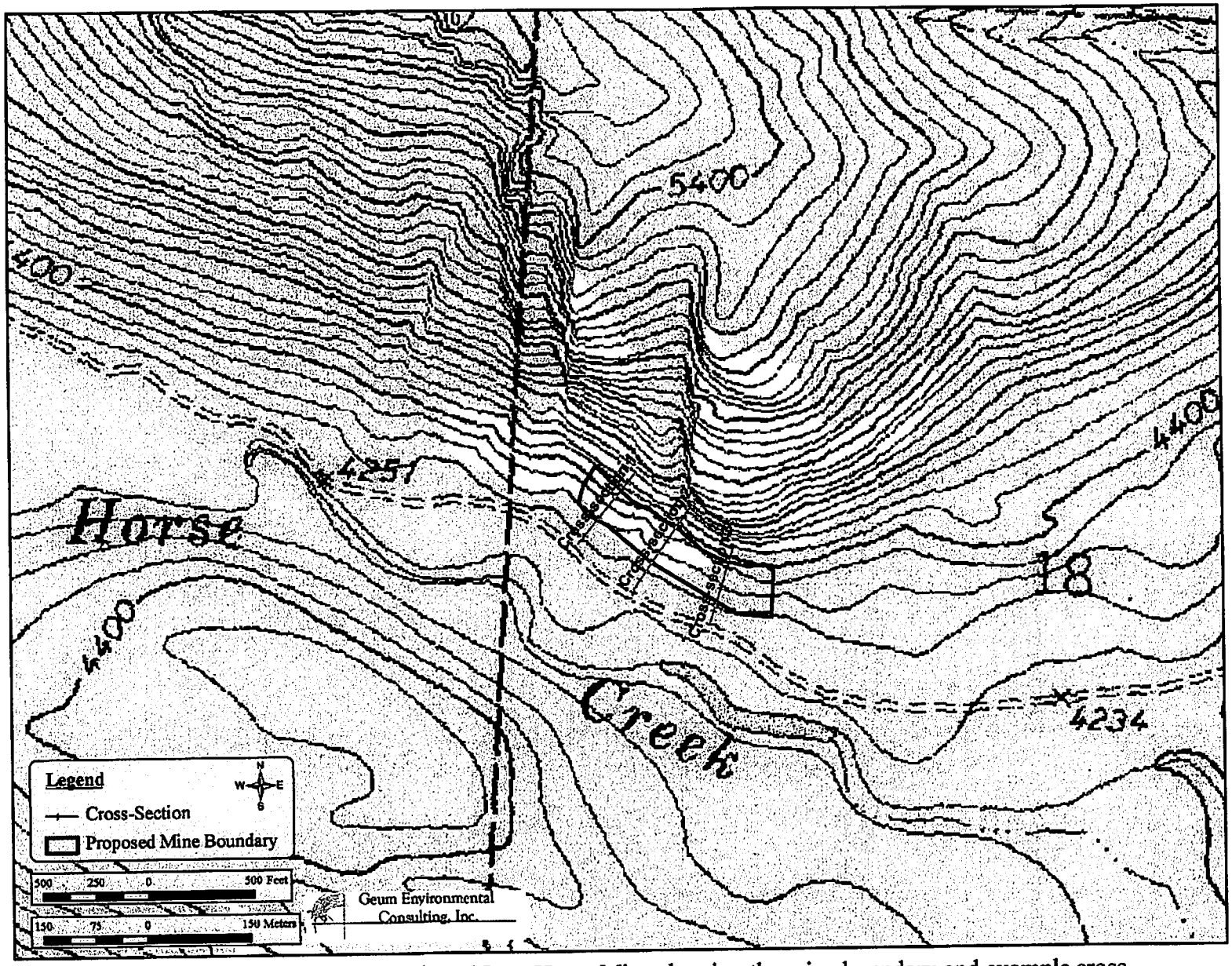

Figure 4. Topographic map of the proposed Lost Horse Mine showing the mine boundary and example cross-sections through the mine site (USGS 1964).

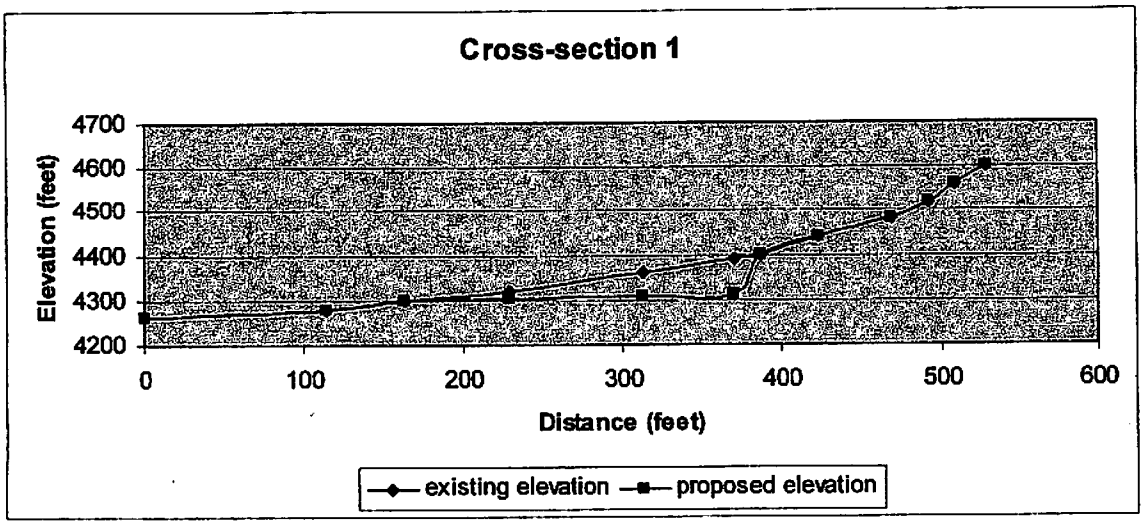

Figure 5. Existing and proposed elevations along cross-section 1 through the proposed Lost Horse Mine.

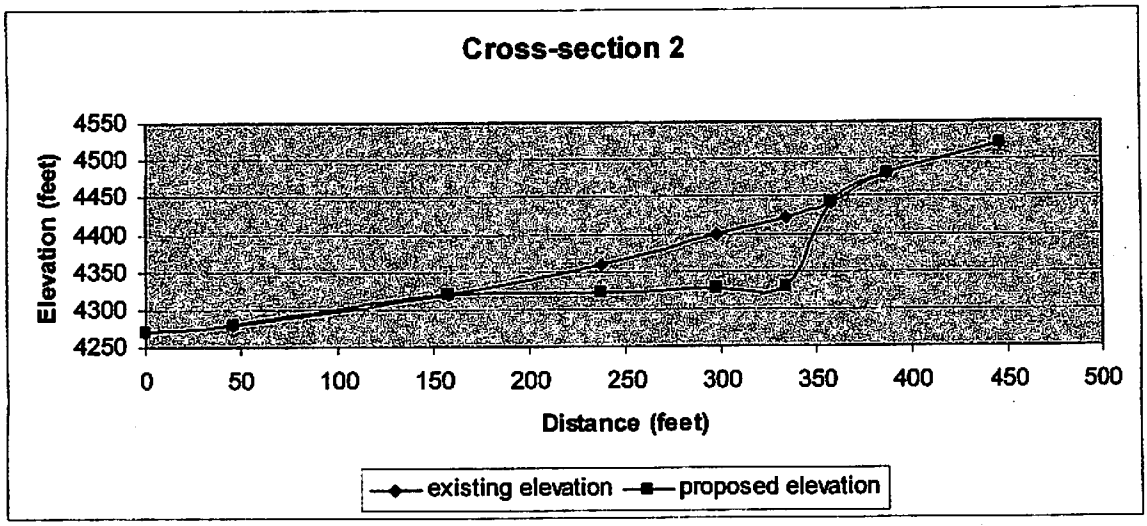

Figure 6. Existing and proposed elevations along cross-section 2 through the proposed Lost Horse Mine.

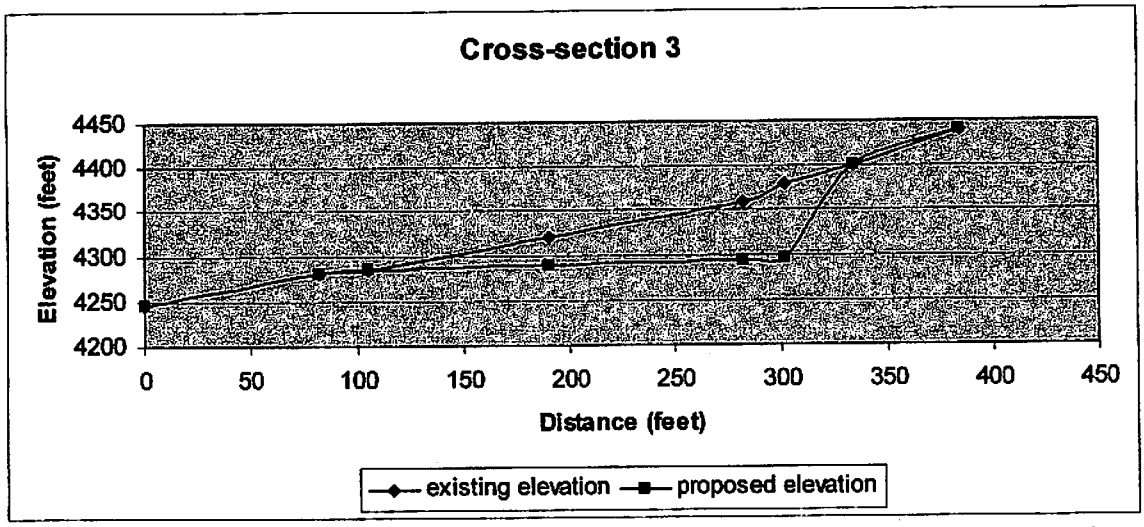

Figure 7. Existing and proposed elevations along cross-section 3 through the proposed Lost Horse Mine.

The total surface area of the mine is expected to be 4.9 acres in size. An average of 15,000 tons of hard aggregate per day is expected during operations. The mine may operate between mid-October and mid-April, Monday through Friday, from approximately 8:00 am to 5:00 pm. The mine would not be in continual use during this period, but this is the time period when operations may occur.

Approximately 15,000 cubic yards of material is expected to be extracted from the mine each year over a ten-year period. A total of approximately 125,000 to 150,000 cubic yards of material is expected to be extracted over the life of the mine.

Ore Processing

Hard aggregate from the mine would be segregated into two classes: greater than three-foot size material and less than three-foot size material. Aggregate greater than three-feet would be stockpiled on-site and later hauled off-site as needed for riprap. Aggregate less than three-feet in size would be crushed to produce two- to six-inch material that would be screened to two-inch. Materials between two and six inches would be hauled off-site and materials less than two-inch would be used for road resurfacing projects including Forest Service Road 62969, Lost Horse Road and other Ravalli County roadways.

Tailing Disposal

No tailings would be created from the proposed Lost Horse Mine.

RECLAMATION PLAN

Introduction

Final reclamation would result in a cleared parking area and surrounding natural area. The parking area would be approximately 0.7 acres and the remaining area would be reclaimed to a grassland community. The grassland community would stabilize the ground surface and create conditions that would likely support recruitment of shrubs and trees. Final reclamation would begin at the end of the ten-year operating period. If the mine is not operated annually, annual maintenance (described below) would still occur and final reclamation would not be implemented until the end of the ten-year operating period. Figure 8 shows a plan view of the proposed reclamation plan.

As the end of this proposed operating period approaches, the Ravalli County Road and Bridge Department may submit a new application to the Department of Environmental Quality and the United States Forest Service for future mining of the site. A future application may propose to revise the reclamation plan presented in this document to facilitate future mining activities.

Annual Maintenance

During non-operational times of the year (mid-April to mid-October), the area would be monitored for the presence of noxious or problematic weed species. Monitoring would occur early in the growing season so weed control measures could be implemented during the same growing season to prevent further spread of any undesired species. Weed control measures would vary depending on the weed species present and their abundance. Possible control measures may include, but are not limited to, herbicide application, hand pulling, digging, biological controls, or seeding cover crop species.

Figure 8. Reclamation plan for the proposed Lost Horse Mine.

Reclamation Performance Standards

Success of the reclamation plan will be based on the following:

- Desired vegetation (described below) will dominate the site;
- Noxious weeds will either be absent from the site or there will be a noxious weed management plan in place to address weed control in the future; and
- Soils will be stabilized by desired vegetation to limit erosion.

Desired vegetation consists of native species already occurring in or near the mine site as well as any vegetation that is seeded as part of the reclamation plan (see Tables 1 and 2 in *Vegetation* section below). Photo 5 below shows an example of plant communities adjacent to the proposed mine site. Non-native species may be considered desired vegetation if they are not noxious weeds and they do not appear to be compromising success of the reclamation plan. Examples of non-native species that may be considered desired vegetation include grasses such as timothy (*Phleum pratense*) or Kentucky bluegrass (*Poa pratensis*) that may naturally colonize the site. The percent cover of desired vegetation would be similar to surrounding areas that are representative of the desired plant community and would not necessarily be 100 percent vegetative cover. Up to 30 percent bare ground is acceptable based on conditions in surrounding natural areas.

The mine site would monitored for three to five years after the end of the operating period when final reclamation measures are implemented to ensure that the performance standards above are met.

Photo 5. View looking east at the existing vegetation community along the southern mine boundary for an example of desired vegetation.

Soil stability and erosion control would be achieved by creating slopes no steeper than 3:1 in mined areas up to the base of the cliff along the north side of the mine and to the southern edge of the mine. Some slopes to the south and outside of the mine are naturally steeper than 3:1, but these areas will not be disturbed by the mining or reclamation activities. Regraded slopes in the mine site would be revegetated as described in the *Vegetation* section below and vegetation would cover approximately 70 percent of the ground surface outside of the parking area. The slope angle combined with vegetation establishment would limit erosion.

Waste Materials and Overburden

No waste materials or overburden would be created from the project.

Soils

Subsoil would consist of mineral soil or aggregate remaining after the rock aggregate has been mined from the site. The subsoil depth would vary throughout the site. The parking area portion of the reclaimed mine site would be leveled and surfaced with 1 ½ inch minus material generated from the mine operations.

There is little to no top soil on adjacent, undisturbed ground and adding topsoil to the site may encourage weed recruitment (Photo 2). To establish seed and limit weed invasion, seed would be mixed with compost and blown over non-parking lot areas of the mine to a depth of ¼ to ½ inches. This is discussed more in the *Vegetation* section below.

Vegetation

Post-reclamation vegetation at the site would consist of a grassland with occasional scattered trees or shrubs and few to no noxious weeds. Trees and shrubs would likely naturally colonize the area over time and no supplemental planting is proposed. Table 1 shows a partial list of species at the site based on observations during a November 2006 site visit. The seed mix in Table 2 below would be used throughout the reclaimed mine site, except in the parking area. The seed would be mixed with compost (EKO Compost or equivalent) and applied using a compost blower to a depth of ¼ to ½ inch over the re-graded native substrate. All seed and compost or mulch material will be certified to be weed free. A slow release, low nitrogen fertilizer such as Biosol® would be mixed with the seed and compost mixture prior to application. As vegetation re-establishes throughout the mine site, wildlife habitat would also be restored.

Table 1. Plant species observed at the proposed Lost Horse Mine site in November 2006.

Scientific Name	Common Name
Salix scouleriana	Scouler's willow
Pinus ponderosa	Ponderosa pine
Populus trichocarpa	Black cottonwood
Centaurea maculosa **	Spotted knapweed
Verbascum thapsus	Common mullein
Achillea millefolium	Yarrow
Pseudotsuga menziesii	Douglas-fir
Hypericum perforatum **	St. Johnswort
Festuca idahoensis	Idaho fescue
Arctostaphylos uva-ursi	Kinnikinnick
Rosa woodsii	Woods' rose
Epilobium species	Willowherb
Fragaria virginiana	Virginia strawberry
Apocynum cannabinum	Indianhemp

** Noxious weed according to Montana State Law.

Table 2. Seed mix for final reclamation at the proposed Lost Horse Mine site.

Scientific Name	Common Name	Pounds per Acre
Elymus trachycaulus ssp. trachycaulus	Pryor slender wheatgrass	8
Festuca ovina	Quatro sheep fescue	4
Elymus lanceolatus ssp. dasystachyum	Critana thickspike wheatgrass	8
Achillea millefolium	White yarrow	0.25
Total		**20.25**

Seed would be applied either in late fall or early spring, as soon as possible after final grading is complete within those timeframes. During the post-reclamation monitoring period, vegetation monitoring would occur early in the growing season to evaluate seed take and the presence of any noxious or invasive weeds. Any necessary weed management activities would occur during the growing season. If seed take is poor and supplemental seeding is necessary, it would occur early the same growing season and/ or the subsequent fall.

Noxious weeds occur within and adjacent to the mine site and they may invade the mine site after the reclamation period. Annual maintenance activities would try to limit weed species abundance and reduce any further noxious weed seed or propagule input to the site. A noxious weed management plan would be developed and implemented to ensure long-term management of noxious weeds. Recovery of desired vegetation would be the most effective measure to protect against weed species after mining has ended.

Stability

The portion of the mine site that would become a parking area would be graded to a level surface tied into Forest Service Road 62969. Surrounding land would be graded and shaped to blend into the surrounding landscape. Excavators, loaders or motor graders would be used for final grading. Final slopes in reclaimed areas would have a maximum steepness of 3:1. The natural rock formations on the north side of the mine would be steeper than the maximum slopes in the reclamation area. Final graded surfaces would be

ripped or scarified prior to seeding. The native substrate used for final grading would consist primarily of mineral soil with little to no organic matter.

A mixture of compost and seed, described above in the *Vegetation* section, would be applied to newly re-graded areas outside of the parking area to decrease erosion and encourage rapid establishment of desired, post-reclamation vegetation. The compost mixed with seed would provide organic matter to support seed germination and growth. Vegetative cover would help resist erosion in the long-term after final reclamation is complete.

Post Mining Solid Waste Disposal

Any solid waste generated during operations or the reclamation period would be hauled off-site; there would be no on-site disposal.

Reclamation of Surface Support Facilities

All support facilities would be removed at the end of the operations period. Some support facilities may be temporarily removed from the site during the operational period to support other Ravalli County Road and Bridge Department operations. As support facilities are permanently removed from the site, the area would be reclaimed as described above. Maintenance of Forest Service Road 62969 would transfer back to the Forest Service at the end of the reclamation monitoring period. The Ravalli County Road and Bridge Department would continue operation of the County-owned portions of Lost Horse Road.

LITERATURE CITED

Ohnstad, David. Memorandum to the Board of County Commissioners. "Crushing Plant-Sound Levels". August 25, 2005.

United States Geological Survey (USGS). 1964. Como Peaks 1:24,000 scale quandrangle. U.S. Geological Survey, National Mapping Division, Reston VA. Geo-referenced image of the map accessed online at: http://nris.state.mt.us/nsdi/drg.html.